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EFFECT OF PIPPALI RASAYANA (PR) TREATMENT ON PATHOLOGICAL PROFILES OF HUMAN *GIARDIASIS* PATIENTS

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ABSTRACT

Pippali Rasayana (PR), a combined ayurvedic herbal formulation, was prepared from *Piper longum* (pippali) and *Butea monosperma* (palash) according to the original methods of Caraka Samhita (2700-600 B.C.). It was administered to 45 human giardiasis patients with definite clinical signs and symptoms and case history at a rational dose of 1 gm. P.O. × 3 × 15 days. The pathological profiles of patients were examined. The findings clearly indicated an overall improvement in pathological profiles of human giardiasis patients. Further, these observations supported the therapeutic potential of this herbal formulation in clinically treating this disease. Taking a lead from our observations, a detailed scientific clinical research is required to develop and establish PR as an alternative futuristic drug of choice for human beings against giardiasis worldwide.

Key words

Human giardiasis, *Giardia lamblia*, pathological profiles, allopathic drugs, herbal drugs, Pippali Rasayana.

Introduction

Giardia lamblia is one of the most common intestinal flagellates infecting a wide range of mammalian hosts (Adam, 2001). This protozoan parasite is a prominent cause of waterborne enteric disease throughout the world. Human giardiasis, caused by *Giardia lamblia*, is marked by more than three watery bowel defecation per day including several clinical symptoms like diarrhea, abdominal pain, vomiting, belching, bloating, fat in stool, ingestion, nausea, appetite loss, malnutrition, cramps, foul smelling stool, weight loss etc. (Taherkhani et al., 2009; Escobedo et al., 2010). The immune status, nutritional condition and age and differences in the virulence and pathogenicity of *Giardia* assemblages in hosts significantly determine the severity of infection and disease (Haque et al., 2005). Further, poor hygiene and low socio-economic status are the major precipitating factors for diarrhea, the malabsorption bowel syndrome, frequently in malnourished human populations (Mandomando *et al.*, 2007; Aremu *et al.*, 2011). This infection varies from 20-60% (Ament and Rubin, 1972) worldwide with an alarming endemicity of about 87% in certain regions of India because of the poor hygiene (Walia et al., 1986) in lower socio-economic groups. The prevalence of *G. lamblia* in human beings ranges from 2 to 7% and 20 to 30% in developed and developing countries, respectively (Solaymani-Mohammadi and Singer, 2010). Approximately 1000 million cases of giardiasis occur worldwide (Wright et al., 2003). Giardiasis, more severe in terms of

morbidity than mortality, adversely affects economy by causing huge loss of productive hours, premature mortality, disability and escalated healthcare costs (Guerrant et al., 2005). The findings of asymptomatic cases (Farthing, 1989) validate the hypothesis of emerging a high degree of variations in clinical signs and symptoms of giardiasis making it more difficult for diagnosis and treatment.

Modern synthetic drugs are sufficient to treat giardiasis (Kumar et al., 1989), however, their inherent side toxic effects, drug resistance, withdrawal effects, relapses, immune suppression, availability expensive nature and intellectual property rights discourage their prompt and frequent uses (Jokipil and Jokipil, 1979; Gardner and Hill, 2001; Wright et al., 2003). The headache, vertigo, nausea and metallic furry tongue are serious issues related to such treatments. Furthermore, pancreatitis, central nervous system toxicity at high doses (Kusumi et al., 1980; Roe, 1985) and transient reversible neutropenia are encountered as severe adverse effects of modern drugs (Lau et al., 1992). Drug induced diarrhea is the most common form of diarrhea in old people probably due to age related effects on kidney and liver involved in drug clearance (Nigro et al., 2000).

These envisaged hazardous complications including accessibility of hospitals in remote areas left no choice than to express a renewed interest and develop immense faith among the people for searching and accepting the indigenous herbal medicines

as remedies for healthcare and clinical management of giardiasis worldwide. Ironically, however, the indigenous systems of healthcare are not properly organized (Tchacondo *et al.*, 2001). The innocuous nature, safe clinical efficacy and better eco-bio friendly actions of herbal formulations as drugs are added benefits. In Ayurveda, *Piper longum* is reported to be used in Krim Roga and works as rejuvenator for the host immune system through Rasayana mode of therapy (Shastri and Chaturvedi, 1986). It stimulates the appetite and dispels gas from intestine. *Piper longum* bears the therapeutic properties against giardiasis (Jadavji, 2011) including anti-giardial and immunostimulatory (Tripathi *et al.*, 1999), anti-amoebic (Ghoshal and Lakshmi, 2002), analgesic (Vedhanayaki *et al.*, 2003), immunomodulatory and antitumor (Sunila and Kuttan, 2004), antidepressant (Hong *et al.*, 2005) and antimicrobial activities (Ali *et al.*, 2007). Earlier reports confer its hepatoprotective activity (Koul and Kapil, 1993). The easy availability, promising clinical efficacy, economic nature etc. and uses in various human ailments like cancer, inflammation, depression, diabetes, obesity and hepatotoxicity (Kumar *et al.*, 2011) further make Pippali clinically more relevant and valuable for intensive research studies to establish PR as an alternative ayurvedic herbal drug against human giardiasis. In spite of these numerous studies on Pippali Rasayana, no report exists on its pathological benefits in human giardiasis patients except for our preliminary observations (Agrawal *et al.*, 1997). Considering all these aspects, we initiated a

composite research study on role of PR in clinically treating giardiasis. This research study is aimed at exploring PR benefits on pathological profiles of giardiasis patients and the results clearly demonstrate the therapeutic relevance of Pippali Rasayana to be developed as a futuristic herbal drug of choice for human giardiasis patients across the world.

Materials and Methods

Pippali Rasayana (PR), a combined ayurvedic herbal formulation, was prepared from *Piper longum* (pippali) and *Butea monosperma* (palash) according to the original methods of Caraka Samhita (2700-600 B.C.) as presented in Caraka Chikitsa (Pandeya, 1983) and followed by Agarwal *et al.* (1994). Pathological profiles of giardiasis patients were studied following the routine standard laboratory procedures as adopted by Agarwal *et al.* (1994).

Microscopic examination of stool

The standard procedure of examining the fecal matter of human giardiasis patients was followed as described by Chatterjee (1980). In brief, a little portion of stool was picked up and diluted in normal saline (0.9%). It was then incubated at room temperature for 15 minutes. Afterwards, a drop of diluted suspension was put on thoroughly cleaned glass slide and covered with a glass cover slip to spread the suspension as thin layer transparent film. Thereafter, a drop of Lugol's iodine (10 g iodine, 20 g/l potassium iodide in distilled water) was put on thin smear to clearly visualize the trophozoites/ cysts.

Human giardiasis patients

The 45 human giardiasis patients, with definite clinical signs and symptoms and positive for trophozoites/cysts in stool, were included in this study. In order to evaluate the therapeutic potential of PR, all the patients were selected from the clinic of International Institute of Herbal Medicine, Gomti Nagar, Lucknow.

Clinical study

The 45 patients, with definite giardiasis signs and symptoms and case history, were

administered 1 gm. of PR filled in veg. capsules P.O. $\times 3 \times 15$ days. Before starting the treatment and after 15 days of treatment, the pathological profiles of these all human giardiasis patients were examined and assessed. The observations recorded in table clearly demonstrated an overall improvement in pathological complications of patients. It, thus, inferred the clinical and therapeutic potential of this ayurvedic herbal formulation.

Results and Discussion

Table - showing the effect of Pippali Rasyana (PR) treatment on various pathological profiles of human giardiasis patients.

S. No.	Pathological Parameters	Before Treatment (BT) with PR		After Treatment (AT) with PR		
		No. of Patients	%	No. of Patients	%	
1.	Consistency of stools	(a) Watery	13/45	28.89	6	13.33
		(b) Semi solid	27/45	60.00	25	55.56
		(c) Solid	5/45	11.11	14	31.11
2.	Color of stools	(a) Yellow	35/45	77.78	42	93.33
		(b) Brown	10/45	22.22	3	6.67
3.	Cysts	41/45	91.11	5	11.11	
4.	Trophozoites	19/45	42.22	Nil	0.00	
5.	Mucus	39/45	86.67	13	28.89	
6.	Pus Cells	33/45	73.33	5	11.11	
7.	Fat Globules	30/45	66.67	8	17.78	
8.	Red Blood Cells	37/45	82.22	7	15.56	
9.	Bacterial Turbidity	31/45	68.89	7	15.56	
10.	Undigested Food Particles	39/45	86.67	7	15.56	

BT- Before Treatment, AT- After Treatment, PR- Pippali Rasayana

This study was conducted on 45 human giardiasis patients with definite clinical signs and symptoms and case history. A scientifically rational dose of 1 gm. TDS (thrice a day) was given for 15 days orally to these giardiasis patients. The findings

demonstrated an overall improvement in the pathological profiles of human giardiasis patients. Frequent and common symptoms of human giardiasis, like pain in the abdomen, dyspepsia, foul smell of stool, headache, body cramps etc. were found

significantly reduced. The PR treatment caused removal of cysts from the stools of 80% patients while stools of 100% patients were found negative for trophozoites. Our observations are in good consonance with earlier reports on antimicrobial roles of *Piper longum* (Ali et al., 2007). These findings substantiated the strong anti-etiotpathogenic nature of PR with profound encouraging clinical efficacy and therapeutic relevance in containment of infection and combating the disease. Similar findings have also been reported by Abbas et al. (1997) and Tripathi et al. (1999). Further, Sunila and Kuttan (2004) reported the immunomodulatory and antitumor properties of *Piper longum*. Having said this much, I may conclude that no reports on PR roles in pathological conditions of human giardiasis patients do exist till date except for our preliminary observations (Agarwal et al., 1997; Abbas et al., 1997). It may be interpreted as a potent candidate drug to treat and clinically cure human giardiasis with immense cysticidal and anti-trophozoite properties. The preceding reports in Ayurveda, on use of *Piper longum* in Krim Roga with rejuvenation properties for the host immune system through Rasayana mode of therapy (Shastri and Chaturvedi, 1986), also provides sound background to move ahead with this study.

Out of 28.89% patients with watery stool condition, nearly 15.56 % were found positively improved due to PR treatment. However, this treatment differentially impacted the consistency of stool. Approximately, the condition of patients

with solid nature of stool improved significantly from 11.11% to 31.11% whereas only about 5 % patients with semi solid stool condition got recovered. The colour and consistency of fecal matter, however, may not be considered as yardstick parameters for effective diagnosis and clinical treatment of human giardiasis. Reports suggest that yellow stool is a sign of mostly unhealthy condition in giardiasis though normal for many people. Likewise, light colour shows the sign of disease but brown colour is indicative of normal condition. It may be envisaged that colour is not so pertinent in diagnosis. Nonetheless, the colour helps in understanding the health conditions of patients. Furthermore, the watery stool condition is considered very bad for health of the patients whereas the semi solid condition of stool is indicative of bad health status.

The pathological complications like mucus, pus cells, fat globules and erythrocytes in stool were found significantly reduced ensuring the clinical impact of the herbal formulation under investigation. Furthermore, nearly 70% patients became free from the undigested food particles in their feces. The PR treatment demonstrated that the fecal matters of several patients became free from bacterial turbidity ensuring the antimicrobial properties of *Piper longum*. Ali et al. (2007) also made similar observations with *Piper longum*. Ghoshal and Lakshmi (2002) reported the antiprotozoan (antiamoebic) effects of Pippali. These findings are indicative of the antibacterial nature of PR which may only

be established by conducting a thorough clinical research study.

Conclusion

The results of this study clearly demonstrated an overall clinical improvement in various pathological profiles of human giardiasis patients and endorsed the beneficial effects of PR. It is an endeavor to therapeutically evaluate PR formulation as an alternative better herbal drug of choice against human giardiasis cases. The present findings also suggest the anti-giardial and immunological impacts of PR on pathological profiles. Ayurvedic Rasayana mode of therapy is known to work mainly as rejuvenator for empowering the clinically effective immunological responsiveness, however, my hypothesis of immunological efficacy associated with PR, against human giardiasis patients, requires a composite scientific clinical validation. The scientific researches are immensely needed for determining the clinical relevance of PR as an innocuous and clinically effective ayurvedic herbal drug of choice by strengthening the immunological status of the host without any demonstrable side effect.

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